

## CLAIMS

1. A method of manufacturing a flow field plate comprising:
  - a. positioning a particulate etchant-resistant mask comprising a pattern design adjacent a plate; and
  - b. particulate etching the plate using a particulate etchant and a particulate etchant accelerator so that a fluid flow pattern determined by the pattern design is formed on the plate.
2. The method of claim 1, wherein the plate comprises electrically conductive material.
3. The method of claim 1, wherein the plate comprises carbon-based material.
4. The method of claim 3, wherein the plate comprises carbon fibre composite material.
5. The method of claim 4, wherein the carbon fibre composite material is densified with a polymeric filler.
6. The method of claim 1, wherein the particulate etching comprises sand blasting.
7. The method of claim 1, wherein the particulate etching comprises bead blasting.
8. The method of claim 1, wherein the particulate etching comprises grit blasting.
9. The method of claim 1, wherein the particulate etching comprises abrasive water jet blasting.

10. The method of claim 6, wherein the particulate etchant accelerator comprises a sandblasting gun.
11. The method of claim 1, wherein the particulate etchant contains an abrasive medium which is harder than the plate.
12. The method of claim 11, wherein the particulate etchant comprises silica grit having a diameter of 180-220  $\mu\text{m}$ .
13. The method of claim 12, wherein the plate comprises a graphitised carbon-carbon composite material.
14. The method of claim 1, wherein positioning the particulate etchant-resistant mask adjacent the plate comprises adhering the mask to the plate with an adhesive substance.
15. The method of claim 1, wherein the particulate etchant-resistant patterned mask is a photoresist mask.
16. The method of claim 1, wherein the particulate etchant-resistant patterned mask comprises a vinyl polymer.
17. The method of claim 1, wherein the pattern design determines a fluid flow pattern having a fluid entry gallery and a fluid exit gallery on the flow field plate.
18. The method of claim 17, wherein the fluid entry gallery and the fluid exit gallery are formed by etching aligned positions on opposite faces of the flow field plate such that the fluid entry gallery and the fluid exit gallery pass through the flow field plate.
19. The method of claim 1, wherein the pattern design determines a sealing groove on the flow field plate.

20. The method of claim 1, wherein particulate etching comprises using a two-axis scanning mechanism to determine the movement of the particulate etchant accelerator relative to the plate.
21. The method of claim 20, wherein the two-axis scanning mechanism enables a predetermined movement of the plate relative to the particulate etchant accelerator such that the movement is in the form of a raster pattern or a stepped scan pattern.
22. A flow field plate formed by:
- a. positioning a particulate etchant-resistant mask comprising a pattern design adjacent the plate; and
  - b. particulate etching the plate using a particulate etchant and a particulate etchant accelerator so that a fluid flow pattern determined by the pattern design is formed on the plate.